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Janet Napolitano
Governor

Herbert R. Guenther
Director

July 23, 2007

Laurie Woodall
Office of the Attorney General
1225 W. Washington
Phoenix, AZ 85007-2997

Docket No. L-00000FF-07-0134-00133

Dear Laurie,

Attached is the Arizona Department of Water Resources' response to the Arizona Corporation Commission Utilities Division staff requested on the potential impacts of the Northern Arizona Energy Projects (NAEP) to the water resources in Mohave County. After reviewing the available water resource data for the Sacramento Valley Groundwater basin, the area that will be affected by withdrawals for the NAEP, the Department has concluded that the impact of the additional water demand from the NAEP will be insignificant.

If you have any questions regarding the memo or the data supporting the Department's conclusions, please feel free to contact me.

Sincerely,

Dale Mason

Dale Mason

Arizona Corporation Commission
DOCKETED
JUL 27 2007
DOCKETED BY

ARIZONA DEPARTMENT OF WATER RESOURCES

HYDROLOGY DIVISION

MEMORANDUM

TO: Arizona Power Plant and Transmission Line Siting Committee

THRU: Frank Putman, Chief Hydrologist

FROM: Dale Mason, Hydrologist, Water Resources Section

DATE: July 18, 2007

RE: Hydrologic Review of the Northern Arizona Energy Project's Power Plant Application, Docket Number L-00000FF-07-0134-00133.

Summary

On April 26, 2007, the Arizona Corporation Commission Utilities Division Staff requested that the Arizona Department of Water Resources (ADWR) address the following subjects regarding the Northern Arizona Energy Project (NAEP) application. Those subjects are: 1) will the project have a detrimental impact upon water supplies in Mohave County, and 2) will the project have any impact on water supplies for existing or known planned developments in Mohave County.

The answer to the first question, will the NAEP have a detrimental impact upon water supplies in Mohave County, is no. A comparison of the expected annual volume of water used by the NAEP to the estimated annual recharge for the Sacramento Valley Groundwater basin indicates that the NAEP may potentially have a small impact on the annual water budget for the basin. A second comparison of the estimated total water use over the life expectancy of the NAEP to estimates of groundwater in storage in the basin indicates that any impacts to overall water supplies in the basin will be insignificant.

The answer to the second question, will the NAEP have an impact on water supplies for existing or known developments, is that the NAEP will probably have an insignificant impact on any such developments. A well impact analysis of NAEP pumpage predicts a maximum drawdown of 15 feet at the pumping well after 40 years of pumping at the maximum projected annual withdrawal rate of 270 acre-feet per year (Figure 1). A drawdown of 4 feet is expected to occur at approximately three-quarters of a mile from the pumping well, and a drawdown of 1 foot is expected at approximately 6.7 miles from the pumping well after 40 years (Figure 1). Wells for the Golden Valley – Phase 1 development can expect additional drawdowns of between 1 to 2 feet after 40 years due to the NAEP. Proposed wells for the planned Golden Valley - Phase 2 development may experience additional drawdowns of 1 to 4 feet (Figure 1).

In all cases, the impacts from the NAEP would by considered insignificant. A detailed discussion of the potential impacts from NAEP is included below.

Impact to Water Resources

Estimates of the annual ground-water outflow from the Sacramento Valley basin have ranged from less than 500 ac-ft per year to as much as 10,000 ac-ft per year (Gillespie, J.B. and Bentley, C.B., 1971; Freethey, G.W. and Anderson, T.W., 1986; Owens-Joyce, 1987; Rascona, S.J., 1991; ADWR, 1997). Groundwater in Sacramento Valley generally flows to the south, paralleling Sacramento Wash, before turning east and flowing out of the basin near Topock, Arizona. In 1997, the ADWR estimated ground-water outflow from the Sacramento Valley basin to be 1,200 ac-ft per year (ADWR, 1997). This estimate was based on water level data, aquifer test results, and a geologic cross-section across Sacramento Valley's ground-water outflow point near Topock, Arizona. Water levels in wells in the southern part of the Sacramento Valley basin have generally been steady over the past 20 to 30 years indicating that the basin's ground-water outflow probably has not been greatly affected by pumpage in the central part of the valley. Therefore, the basin's outflow is probably equal to the annual aquifer recharge.

The NAEP is a peaking plant that will be used to supply electrical power during times of peak demand and is expected to run an average 2,500 hours per year and use 160 acre-feet of water per year. A worst case scenario of the NAEP running for 5,000 hours per year would result in a water use of 270 acre-feet per year. The range of water use by the NAEP represents from 13 to 22 percent of the estimated annual recharge for the Sacramento Valley basin. However, the expected NAEP annual water use probably falls within the range of uncertainty of the ADWR recharge estimate.

Current water use in Sacramento Valley is estimated at about 2,900 ac-ft per year (Tadayon, 2004, Southwest Groundwater, 2007). Water uses consist of about 1,500 ac-ft for municipal/domestic use and about 1,400 ac-ft of industrial pumpage. The majority of the industrial pumpage, about 1,200 ac-ft per year, is for the Griffith Power Plant. Annual historic water use estimates have ranged from less than 500 ac-ft per year to as much as 6,000 ac-ft per year during the late 1960s and the 1970s (Rascona, 1991; Tadayon, 2004). The high water use during the 1960s and 1970s was due to withdrawals for mineral extraction and processing by the Cyprus Metals Company (Rascona, 1991). In 1989 the mine was placed on stand-by and withdrawals for mining have decreased to about 300 ac-ft per year. Future pumpage in Sacramento Valley may exceed 30,000 ac-ft per year if the planned developments reach full build out, the mine becomes active again, and the Mohave County water system reaches its maximum capacity of 4,800 gallons per minute (7,260 ac-ft per year).

Estimates of the volume of groundwater in storage above 1,200 feet below land surface and available for withdrawal in Sacramento Valley basin ranges from 2.3 to 13 million acre-feet (Gillespie, J.B. and Bentley, C.B., 1971; Freethey, G.W. and Anderson, T.W., 1986; ADWR, 1994). Total water use by the NAEP over its 40 year life expectancy would be between 6,400 and 10,800 acre-feet, which represents much less than one percent of the total groundwater available in storage.

Impact to Future Developments

A well impact analysis of NAEP pumpage assigned to a single well in the existing Mohave County Well field produced a maximum drawdown of 15 feet at the well after 40 years of pumping the maximum projected annual withdrawals of 270 acre-feet per year (Figure 1). A drawdown of 4 feet is expected to occur at approximately three-quarters (0.75) of a mile from the well, and a drawdown

of 1 foot is expected at approximately 6.7 miles from the well after 40 years (Figure 1).

The well impact analysis indicates that the existing Mohave County well field, which supplies water to the county industrial park, will be most affected by withdrawals for the NAEP (Figure 1). After 40 years the existing county wells can expect additional drawdowns of between 3 and 15 feet. Wells supplying two major proposed developments may also be slightly affected by withdrawals for the NAEP. Water supply wells for the permitted Golden Valley development can expect additional drawdowns of between 1 and 2 feet after 40 years due to NAEP pumpage (Figure 1). Wells for the proposed Golden Valley Phase 2 development, which is under review by the ADWR, may experience additional drawdowns of 1 to 4 feet after 40 years at its proposed well sites (Figure 1). Drawdowns of such small amounts will probably have an insignificant impact on the water supplies for these developments.

Attachments:

Figure 1). Maps showing NAEP well impact analysis and locations of existing and future developments, Sacramento Valley

References:

Arizona Department of Water Resources, 1994, Arizona water resources assessment, Volume II, Hydrologic summary: Arizona Department of Water Resources, 236 p.

Arizona Department of Water Resources, 1997, Technical memo from Frank Corkhill to Karen Modesto on groundwater flux from Sacramento Valley, 4 p.

Freethey, G.W. and Anderson, T.W., 1986, Predevelopment hydrologic conditions in the alluvial basins of Arizona and adjacent parts of California and New Mexico: U.S. Geologic Survey Hydrologic Investigations Atlas HA-664.

Gillespie, J.B. and Bentley, C.B., 1971, Geohydrology of Hualapai and Sacramento Valleys, Mohave County, Arizona: U.S. Geological Survey Water-Supply Paper 1899-H, H1-H37, 2 sheets.

Owens-Joyce, Sandra, 1987, Estimates of annual average tributary inflow to the lower Colorado River, Hoover Dam to Mexico: U.S. Geological Survey Water-Resources Investigation Report87-4078, 1 sheet.

Rascona, S.J., 1991, Maps showing groundwater conditions in the Sacramento Valley Basin, Mohave County, Arizona - 1991: Arizona Department of Water Resources Hydrologic Maps Series Report Number 21, 1 sheet.

Southwest Ground-water Consultants, Inc, 2007, Evaluation of pumping impacts of the Northern Arizona Energy Project (NAEP) on the Mohave County water system well field and the Sacramento Valley Aquifer. Mohave County, Arizona.

Tadayon, Saeid, 2004, Water withdrawals for irrigation, municipal, mining, thermoelectric-power, and drainage uses in Arizona outside of Active Management Areas, 1991-2000: U.S. Geological Survey, Scientific Investigation Report 2004-5293, 28 p.

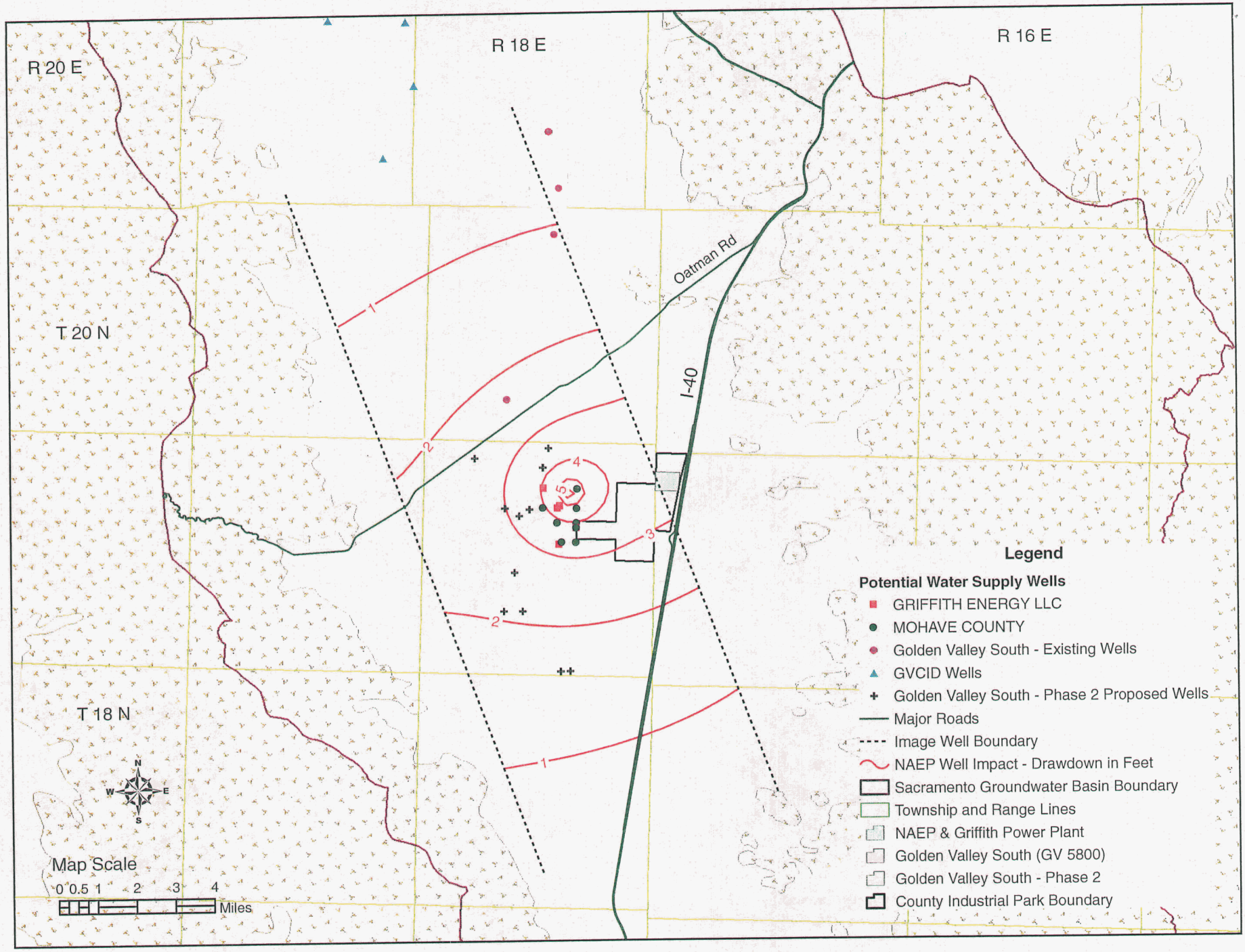

Figure 1. Map showing NAEP impact analysis and existing and planned developments, Sacramento Valley.